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VIEWS, NEWS AND INTERVIEWS.

A novel method of perforating iron plates is reported from Salt Lake City, says a daily paper. The city is being supplied with electricity for lighting and power, generated 14 miles away in the Big Cottonwood Canon. It was found necessary for the purpose of pipe connections to cut four 48-inch openings in the seven-foot penstock, the plates of which were half an inch thick. The workmen began to cut with cape chisels, but the progress made was too exasperatingly slow for the engineer of the works, R. M. Jones, who is known throughout the West as the "cowboy engineer." Mr. Jones took up his rifle, and, using steel bullets cased with copper, shot a line of holes through the plates from a distance of about 30 feet. The intervening edges were afterward easily cut out, and in a very short time the job was finished.

"This here new light of Edison's would be a good thing to hev in hotels, I'm thinking," remarked Mr. Hayseed, as he blew out the gas. "I wonder if I shall live to see it?" —*Chicago Dispatch.*

It is reported that a new wheel-pit is to be constructed at Niagara, adjoining the present one, capable of containing four turbine wheels and four dynamos, each of them with a capacity of 5,000 horse-power, at a cost of $2,000,000. When completed, within two years, the capacity of the two pits will be 45,000 horse-power.

The superintendent of telegraphs and electric lighting on the Great North of Scotland Railway draws the munificent salary of £250 a year.

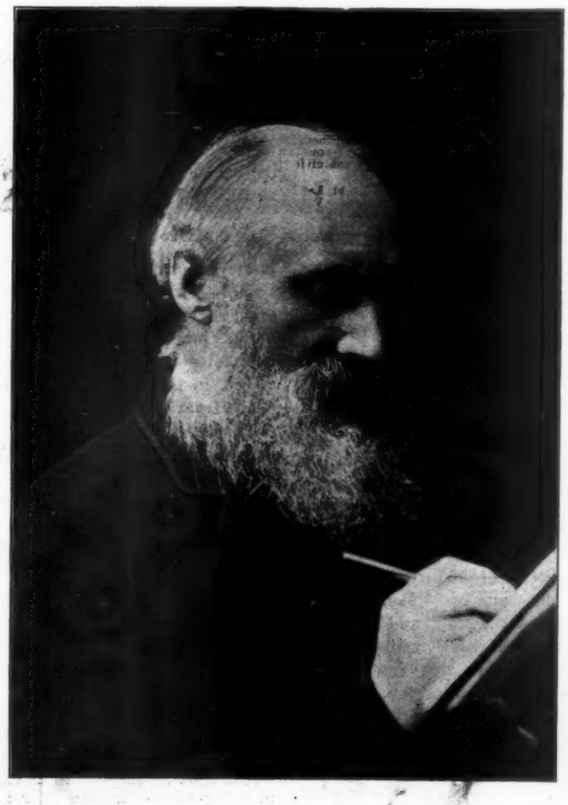
Andrew L. Rodriguez, 15 years old, has secured a verdict for $11,500 in his suit in the Supreme Court in Brooklyn, N. Y., against the Coney Island & Brooklyn Railroad Company, for injuries in a trolley accident. Over three years ago the boy was run over by a car on Ninth avenue. One leg was so badly crushed that it had to be amputated, and the other was permanently deformed and disabled.

Detroit Public Lighting Commission.

Mr. Alex Dow has declined a reappointment to his present position as electrical engineer of the Detroit Public Lighting Commission, with title of city electrician, and has accepted employment as manager of the Edison Illuminating Company of Detroit.

Mr. Will F. Conant, secretary of the Public Lighting Commission, has been appointed for the ensuing year as secretary and general manager, and to him all correspondence concerning the general business of the plant and concerning the purchase of supplies should be addressed.

Mr. Walter D. Steele, at present assistant electrician, has been appointed in Mr. Dow's place as city electrician, and will have charge of the engineering department and of the operating and construction forces. Correspondence on purely technical matters should be addressed to him. The changes above stated will take effect July 1.



Kelvin May 1/93

"Hellé," the latest operatic success in Paris, was heard recently by electrophone in London, the sound being transmitted over the London-Paris telephone circuit.

LORD KELVIN'S JUBILEE.

ELABORATE CELEBRATIONS IN HIS HONOR AT GLASGOW—HE HAS OCCUPIED THE CHAIR OF NATURAL PHILOSOPHY AT GLASGOW UNIVERSITY FOR 50 YEARS—PROGRAMME OF THE CEREMONIES—AMERICANS CONGRATULATE LORD KELVIN OVER THE COMMERCIAL CABLE COMPANY'S LINES.

Fifty years is a long time. When one man has been doing the same kind of work for 50 years, the fact immediately becomes interesting. When that man is such an eminent scientist as Lord Kelvin, the interesting fact becomes historical. This has been appreciated by the University of Glasgow and the city of Glasgow, and on Monday evening, June 15, elaborate ceremonies were begun, marking the jubilee of Lord Kelvin's 50 years of service as professor of natural philosophy in the University of Glasgow.

The programme of the celebration was as follows: On Monday evening, at 8.30 o'clock, the University gave a conversazione and there was also an exhibit of Lord Kelvin's inventions. On Tuesday addresses were presented to Lord Kelvin by representatives of home and foreign universities, learned societies of which he is a member, delegations of students from other universities and from students and alumni of the University of Glasgow. On Tuesday evening the city gave a banquet to Lord Kelvin, to which all the visitors who were invited to the jubilee were asked. To-day the Senate of the University has invited the visitors of the University staff for a sail down the Clyde. The students of the University and their friends will also enjoy a similar trip. The representation of scientific men from all over the world is remarkable for its eminence and numbers.

It seems only proper that prominent scientists should assemble to do Lord Kelvin honor on this auspicious and historic occasion. It will be remembered that in 1889 a dinner was given in London to Prof. Elihu Thomson, of the United States. Lord Kelvin, then Sir William Thomson, made the

journey from Glasgow to London, 400 miles and return, in order to be present at this banquet. A representative of the ELECTRICAL REVIEW was among the guests, and a full account of the dinner was cabled to this journal.

The unanimity of opinion among scientists all over the world as to the remarkable genius and abilities of Lord Kelvin is one of the highest tributes that could be paid to any man. Some one has said that when future generations look back at his career they will assign to Lord Kelvin a place second only to Newton. While there is scarcely a field of science which he has not explored, and in which he has not been a discoverer and inventor, he is pre-eminent as a physicist. As a matter of interest, it may be stated that there is scarcely a British ship upon the seas which is not equipped with the Thomson compass.

The list of Lord Kelvin's honors includes the following: He is LL.D. of the universities of Edinburgh, Cambridge, Dublin, Montreal and Bologna; D.C.L. of Oxford; M.D. of Heidelberg; F.R.S.; P.R.S.E.; foreign associate of the French Academy of Sciences; grand officer of the Legion of Honor of France; commander of the Order Leopold, of Belgium, and knight of the German order "Pour le Merite." In 1872 he was re-elected fellow of St. Peter's College, Cambridge. He is now for the third time president of the Royal Society of Edinburgh. From 1890 to 1895 he was president of the Royal Society of London, and in 1871 was president of the British Association for the Advancement of Science at their meeting in Edinburgh.

Lord Kelvin's father was a scientific man and a mathematician of unusual ability. He was professor of mathematics in the University of Glasgow at the time when his son was beginning his career in the chair of natural philosophy. To his careful training Lord Kelvin owes the solid foundation on which he based his future acquirement of knowledge. Lord Kelvin began to write for the technical journals at the age of 18. When 22 years of age he was appointed to the chair of natural philosophy in the University of Glasgow, which he has now occupied for 50 years. At the foot of the hill on which the University of Glasgow is located is a turbid stream, the Kelvin, from which Sir William Thomson took his title when he was made a peer.

The patents standing in the name of Lord Kelvin are of many kinds, largely electrical, and they are so numerous and valuable that a large shop in Glasgow is kept busy supplying instruments and apparatus made under them.

On Monday evening, the Commercial Cable Company invited a number of their friends to be present at their offices, 253 Broadway, between 3 and 5:30 o'clock, to take part in the jubilee celebration. A telegraph circuit was established by means of the Commercial Cable Company's system with the hall at Glasgow in which the exercises were held. Among those invited to be present at the New York end of the line were the following:

Thomas A. Edison, Nikola Tesla, Prof. Elihu Thomson, Edward Weston, Prof. William A. Anthony, Hon. Seth Low, Frank J. Sprague, Dr. Louis Duncan, Prof. Edwin J. Houston, Prof. Henry Morton, Prof. C. F. Chandler, Prof. M. I. Pupin, Prof. F. B. Crocker, A. E. Kennelly, George A. Hamilton, Dr. Charles E. Emery, John Bottomley, H. Bottomley, and William Morse. The invitation was also extended to the editors of the electrical journals of New York, several of whom were present.

The portrait of Lord Kelvin, which is presented herewith, is from a photograph presented by him to Dr. Henry M. Field, editor of *The Evangelist*, by whose courtesy it is here used.

On Monday the ELECTRICAL REVIEW sent the following cablegram to Lord Kelvin:

The ELECTRICAL REVIEW sends most cordial greetings and congratulations to Lord Kelvin, whose achievements have so honored and advanced electrical science. We know that we express the unanimous sentiment of the electrical fraternity of the United States in assuring you of our affection, esteem and hearty wish for your continued health and strength.

TELEPHONE NEWS AND COMMENT.

The Bell Telephone Company, of Missouri, have placed 30 long-distance telephones in the St. Louis convention auditorium.

The action of the directors, authorizing the issue of $4,000,000 bonds by the Erie Telegraph and Telephone Company, has been ratified by the stockholders by large vote, only 75 shares opposing the action.

Thomas M. Ferguson, of Macon, Miss., writes to the ELECTRICAL REVIEW that he is in the market, with cash, for a 100 point up-to-date switchboard, 25 long-distance telephones and 50 miles of wire.

The directors of the American Bell Telephone Company on June 10 declared a regular quarterly dividend of three per cent and one and one-half per cent extra. Dividends are payable July 15 to stock of record June 30. Books close July 1 to 14, both days inclusive. The stockholders have subscribed for 17,230 shares of the new issue of 21,500 shares of stock, leaving but 4,270 shares to be sold by auction.

President Colgate, of the Mexican Telephone Company, has resigned, and Mr. Charles A. Browne, treasurer of the Mexican Central Railroad Company, has been elected president. W. French Smith, treasurer, and James Cooney, secretary, were re-elected. Mr. Browne has been a director of the company for the past year, and his election to the office of president makes all the administrative offices of the company located in Boston. This change will make a reduction in the company's expenses.

American Machinery for Japan.

Some years ago a number of Japanese manufacturers decided to adopt the use of water for power purposes, and sent a representative party to America to study its adaptation and find the best machinery. After an inspection of various water-power plants, to become familiar with the various types of machines, they placed a large order for exportation with the Dayton Globe Iron Works, of Dayton, Ohio, and since that time this company has sent large numbers of their turbine wheels and machinery to the Orient. Some time ago other Japanese capitalists decided to construct some new mills, and I. Murata and M. Kanda were sent to America to purchase the most modern water-power appurtenances for them. After spending two months in the consideration of the question, visiting many plants, including those at Holyoke and Niagara Falls, the order was placed in the hands of the Dayton Globe Iron Works.

The order included one pair of 45-inch special New American turbines, mounted horizontally, guaranteed to develop 2,204 horse-power under 60 feet head; one pair of 42-inch wheels, guaranteed to develop 1,500 horse-power under 56 feet head, also mounted horizontally in iron flume, and one 25-inch special New American, placed in horizontal iron flume, guaranteed to develop 350 horse-power under 56 feet head.

The illustration herewith shows the machinery, requiring an entire train in transit. In addition to this, several weeks ago they shipped three carloads of water-wheel machinery for a spinning mill in Japan and several 25-inch turbines for a silk company in Tokio.

This is a most important showing for the Dayton Globe Iron Works as the Japanese are fast acquiring the reputation for skill and ability in mechanical and manufacturing matters.

A TRAIN LOAD OF AMERICAN MACHINERY FOR JAPAN.

Northwestern Electrical Association.

The fourth semi-annual convention of the Northwestern Electrical Association will be held at Marinette, Wis., on Wednesday, July 15. A number of interesting papers will be read and the social features promise to be very enjoyable.

The Royal Electric Company's Apparatus.

It is not surprising to see a gradual advance towards simpler devices in all branches of electrical engineering. Looking back only a decade, we remember that dynamos were constructed with the view of accomplishing the electrical result desired only. With exception of mechanical strength, the outward appearance, simplicity, etc., were points of very inferior order. The times have changed. To-day, even the commutator of the continuous-current dynamo is found fault with, and the demand is for simpler machines. It is this which was one of the main factors which brought the alternating-current apparatus so quickly and prominently to the front. Instead of a commutator, as in the direct-current dynamo, only two sliding rings were required in the alternators, and even these are beginning to get out of date. In a few years we may find alternators with high-tension sliding rings in some central stations, but it is claimed in several quarters that manufacturers will not be able to sell them when inductor dynamos are on the market.

Fig. 1 shows an inductor alternator built by the Royal Electric Company, of Peoria, Ill. This company was the first to introduce inductor alternators in this country, and has installed them since 1890. The figure shows their present type 1,000-light dynamo in its complete state. The details of construction are plainly visible from Figs. 2 and 3. In Fig. 2 the bearing stands and the rotary field-magnet poles have been removed so as to expose the armature, armature coils and field winding. On the substantial base is cast a saddle which embraces a skeleton cast-iron spider, on which are mounted circumferentially laminated blocks, which are held in position by two screws each. These blocks extend over the spider to a considerable extent and their free ends are occupied by the armature coils. (See Figs. 1 and 2.) Centrally between the armature winding is located the field magnet coil, the spool of which is provided on each side with four lugs, by means of which it is attached to the armature spider. In the central opening belongs the core shown in Fig. 3. This field-magnet core, which is wrought-iron, is provided with two end plates of star-shaped form, each plate having nine pole extensions, the intermediate space being occupied by wooden blocks, which prevent air churning. It will be clear that the magnetic lines pass from the central core, through the pole plates and extensions on one side to one-half of the armature core blocks. From them to the other side of the machine to the second set of pole extensions and back to the core. The projections on one

side are all of North polarity, and those on the other side all of South polarity. The air gap between the stationary structure and rotary magnet pole is but one-eighth inch long and, as the iron cross-section is ample, the magnetic field is a strong one. The armature coils have a very favorable position, inasmuch as their dimensions, turns or configuration do not in the least interfere with the favorable magnet circuits. On this account they are heavily insulated and can stand any voltage now in use. The two sets of armature coils, visible to the right and left, may be utilized in separate circuits or in the same. In the latter case they are simply connected in parallel.

The ends of the field-magnet coil are brought to the two small terminals shown on top of the machine, while armature coils are connected to the two large binding posts on the terminal board, which also are to receive the circuit wires. A small exciter is furnished by the company for separately exciting the alternator, and this exciter is operated by means of the small pulley mounted on the alternator shaft. The bearings are self-oiling and of ample dimensions, a sight tube being provided so as to see the height of the oil. The smaller machines have but eight and 16 coils on either side, and the armature coils, instead of forming a single series on each side to produce 1,000 to 1,100 volts, may be grouped in parallel so as to produce 110-120 or 220-250 volts, to enable the use of these machines for incandescent lighting without the use of transformers.

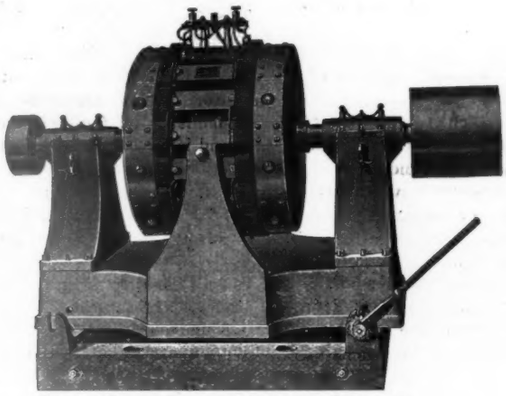


FIG. 1.—ROYAL ELECTRIC COMPANY'S INDUCTOR ALTERNATOR.

FIG. 2.—ARMATURE COILS AND FIELD WINDING OF ROYAL ALTERNATOR.

Fig. 4 shows one of the transformer types built by the company. They claim for it good regulation and efficiency. One of the features of novelty on this transformer is the fuse plug, which extends from the front to the back. The fuse is about three inches long and is mounted on a long plug, the handle of which projects beyond the transformer box. By means of a bayonet lock the fuse contact is locked; it is removed by turning the handle three-quarters to one turn around its axis. The handles are protected by the sphere-shaped projections which are pivoted centrally around the thumb screw. On loosening the latter the spheres are bodily removed from the casing and the handles become visible.

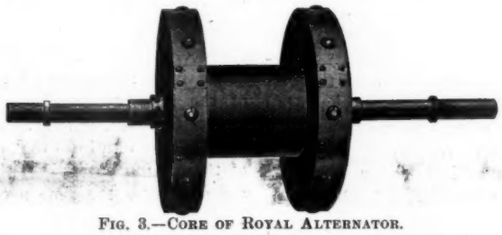


FIG. 3.—CORE OF ROYAL ALTERNATOR.

Fig. 5 shows one style of switchboard used for single units. It has a handsome appearance. The frame is cast-iron and provided with three divisions, into which slabs of polished slate, one foot by three feet each, are inserted. It is provided with an amperemeter and a voltmeter, the latter being connected to the switchboard transformer, located between them. The lamps above the instruments are provided generally with aluminum reflectors. Below the transformer are located the main line fuses and ground detector. To the left is the main switch, to the right the exciter rheostat, of which the contact points only appear on the front of the panel. The resistance consists of insulated German silver wire wound on fire-proof spools, generally of mica. The current, as well as the heating, is very small, and this device is, therefore, light and, in proportion, smaller than the average resistance box.

The Royal Electric Company furnish the following figures in regard to the performance of some of their machines, which figures are those of actual tests made on dynamos before shipment. These figures refer to the relative amount of energy between exciting power required and output of machine.

An alternator of 37,500 watts capacity (750-light) at an output of 12,396.8 watts (about one-third capacity) required an excitation of but 37.4 watts—0.3 per cent—and at an output of 26,780 watts the exciter delivered 63.75 watts to the field magnet, or 0.24 per cent of energy of the output.

In a larger machine the figures were, relatively:

Output.	Excitation.
46,000 watts.	184.8 or 0.4 per cent
40,446 "	125.4 " 0.3 "
27,037 "	84. " 0.3 "

Generally in larger machines the percentage of the excitation should be lower than in smaller ones. The cause of the difference in the present figures is that in the smaller machines of the Royal Electric Company the magnetic density is kept very low, while in the particular 1,000-light machine given above the density was higher, but even then it shows a percentage between excitation and output which, for economy, leaves little to be desired.

The Newton, Mass., Street Railway Company has been ordered by the Waltham city government to make certain changes in its tracks which will cost $10,000. If the order is insisted on, the company threatens to discontinue the operation of a portion of its road in Waltham, and the threat is made on the other side that if this course is adopted, the road's franchise will be revoked and given to an outside corporation.

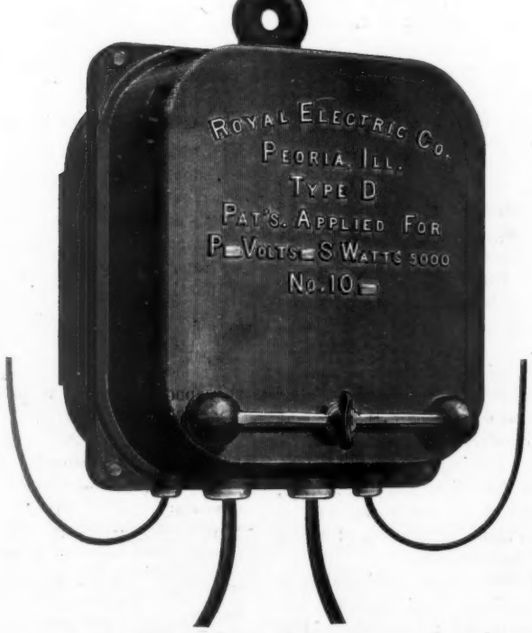


FIG. 4.—ROYAL ELECTRIC COMPANY'S TRANSFORMER.

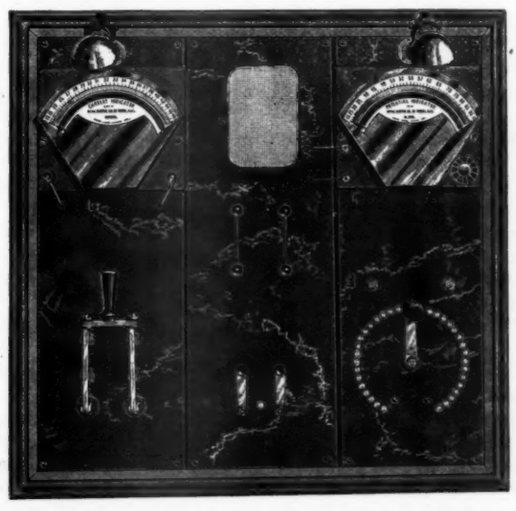


FIG. 5.—ROYAL ELECTRIC COMPANY'S SINGLE UNIT SWITCHBOARD.

ELECTRICITY AND WATER POWER.

BY MARK A. REPLOGLE.

(Continued from page 245.)

POWER TRANSMISSION.

The ordinary methods of transmission, such as by shafting, belting and cable, are so well known that we will not comment, except to say that they waste too much power for long-distance transmission; hence are not considered when the distant water fall is to be harnessed. There are, however, two kinds of transmission that are receiving the attention of our engineers—pneumatic, or air transmission, and electrical transmission.

Pneumatic transmission is purely mechanical, but offers some economical advantages that even electricity does not offer. There are conditions where this method could be employed with greater efficiency than electric currents. In cases where factories are run by steam power the energy could be conducted from the water power in air mains, from which the engines could be supplied, saving to the factory the cost of motors and the other necessary changes.

If the supply of air was in any way limited, it could be allowed to pass through the engine boilers and expanded with fuel. We are told that fully 70 per cent useful effect can be had from fuel in this way, as compared with steam power which limits the useful effects to less than 15 per cent of the energy that the fuel contains. There is, however, a great loss in compressing air and transmitting it, giving to electrical transmission an advantage, especially in long-distance transmission.

The success of long-distance electrical transmission is being demonstrated in various parts of the civilized world. A government experiment in Germany demonstrated that 200 horse-power could be transmitted 109 miles with a loss of only 28 per cent. This is less than that sustained by many of our finest factories in transmitting power mechanically to remote rooms. The experiment at Niagara has demonstrated that power can be taken from water in large and economical units, and it will be demonstrated that the same power can be transmitted to Buffalo and sold with profit for less than steam power costs.

Electrical transmission is of three kinds, and may be called continuous-current transmission, alternating-current transmission and polyphase-current transmission. They have been developed in the order named. All our street-railway systems are using the continuous current for driving their motors, and the pressure used is about 500 volts. A higher pressure would be more economical as far as saving power is concerned, but would be more dangerous to life and to machinery. Hence 500 volts is about the limit of the pressure used in commercial work where continuous currents are employed. There are some exceptions to this.

Alternating-current transmission is yet in its infancy. While it has the advantage of allowing high pressure in the primary transmitting wires, which can be transformed to safe pressure in buildings and at point of consumption, yet for power transmission it is not considered the best, on account of the necessity of the motor being or running at all times in synchronism. Sudden changes in load or overload may affect its speed and cause trouble. It is also troublesome to start a synchronous motor. Alternating currents are often used to good advantage in power work by being made continuous with a rotary transformer. These currents are used to best advantage in lighting.

Polyphase currents, in reality, are compound alternating current. They offer great advantage in power transmission. By their use the electrician can use a motor of high efficiency, that does not need to run in synchronism. No sliding or revolving contacts are required. The current required in the armature is an induced current, and has no metallic connection with the external currents. On this account such motors are called "induction motors." Polyphase currents admit of a circuitous change of polarity in the field magnets of the driven motor, making it possible for it to start itself with a small load. These currents have the advantage of transformation. Polyphase currents, induction motors and rotary transformers, without doubt, are the best avenues through which we can bring our water powers to manufacturing and trade centers.

Since electrical power is better adapted to speed and haulage than steam, we can expect in the future to see our great railroad lines operated by the new valueless water powers in the country.

The agent that makes it possible to use the energy of the distant water falls is that quiet looking engine we call the dynamo. Without it, electricity could be of little value to humanity. By its mysterious powers we are enabled to harness the mountain torrent and distribute its energy in our dwellings and factories. The sunlight absorbed to carry the water to the hills and peaks is returned to us as an article of commerce.

When the dynamo is dissected it proves to be nothing more than a pump that can put in motion that unseen something we call the electric fluid, and any loss of energy through it is due to friction; that is, electrical friction, as the mechanical friction is a very small ratio of the power applied to it. This will be evident when we state that it is not uncommon for a dynamo to convert into electrical energy 95 per cent of the mechanical energy applied to it.

The further energy that is lost in transmission is due to the friction of the current passing through the transmitting wires, hence is lost in heat. The electrical engineer reduces the total loss by putting his transmitting current under high tension or pressure, thereby reducing the quantity of current that must flow. The polyphase system of transmission enables us to convert electrical energy into higher or lower tensions to suit our particular needs, and for its discovery and outline we are indebted to that fearless and intellectual son of Servia, Nikola Tesla.

SUGGESTIONS.

There is no form of energy that is so farreaching in its benefits to the welfare and comfort of the world as electrical energy.

There is no force of means so plentiful in a static condition as electricity.

There is no kind of power that can be so absolutely controlled by a consumer as electrical power.

There is no source of energy so easy of access or so richly provided as water power.

There is no form of motion that is more perpetual than a water fall.

There is no machine that depreciates so little for the amount of work it performs as the dynamo.

There is no medium of transmission so little wasted by transmitting power as a wire.

There is no form of investment more certain of continual returns than an intelligent development of electrical water-power plant.

There is no reason for delaying the use of our water falls, except that our investors do not as yet fully appreciate their importance.

We have attempted to tell a few of the facts concerning electricity and water power, and have endeavored to put them in a form that will allow of their being grasped by those who can not spend the time necessary to study these subjects in a technical way. We have entered very little into detail, and only on points that we deemed necessary.

The harnessing together of electricity and water power is of special interest to many. The proposition is so farreaching that it excites the curiosity and admiration of all.

There are water falls enough to turn all the machinery required for the comforts of mankind for centuries to come, and, unlike other sources of energy, they are exhaustless.

By the union of electricity and water power our great and now smoky manufacturing cities can be made models of comfort and cleanliness.

By the combination of these two forces, the locomotive with its soot and cinder can be hushed and sidetracked.

By the adoption of these sources of energy and heat our great blast furnaces and smelting works may become odorless and clean.

By the linking together of these two most bountiful gifts of Nature, the labors of all the world may be lightened and the comforts of all its inhabitants increased.

The recent rapid development in useful applications of electrical science has opened up a wide field of possibilities, and, what a few years ago would have been thought utterly visionary, men now are ready to look upon as only a question of time sure to be attained in the end.

(To be continued.)

LITERARY.

The bright society magazine, *Form*, shows a steady improvement since the transfer of ownership, and the issue for the month is full of dainty half-tone illustrations of society people and *fin de siecle* social doings and etiquettes. The magazine is now published by the Form Publishing Company, of Fifth avenue, New York.

The feature of *Godey's Magazine* for June is a society sketch, called "The Belle of the Dinner," by Leon Mead. The story is in Mr. Mead's ingenious style of a dinner in swelldom which had a peculiar outcome. Some other things in *Godey's* this month are "The Beauty of Mary Stuart," with illustrations, "Great Singers of this Century" and much general matter of an eclectic nature which make it an interesting number.

The newspaper fraternity and lovers of humor everywhere will be pleased to know that Alex. E. Sweet, the famous humorist and editor, has returned to his old home range in Texas where he founded and made a world-wide success of the *Texas Siftings*, which was at one time widely known and quoted. Mr. Sweet's new paper, the *Texas Sifter*, is already well established in its new home at Dallas, Texas, and is winning fresh laurels and fame for its editor and owner.

H. Milton Kennedy, general passenger agent, announces that the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., will publish a monthly paper, called *The Trolley*. This is the first publication of its kind ever put out by a street railway company, and it is expected to prove of value to the company in advertising their special car service as well as the pleasure resorts reached by their lines, and to increase general traffic. The paper will be distributed each month throughout the Greater New York.

Electrical Stocks in May.

In the month ended June 1, electrical stocks declined, owing to conditions that depressed the general security markets. There were some exceptions, but none of importance. The losses were in no case great. In a general way it may be said that these securities suffered less than the railroad and industrial issues. A comparative table follows:

	May 1.		June 1.	
TELEPHONE:	Bid.	Asked.	Bid.	Asked.
American Bell.....	206	206½	205½	206
Bell Telep of Mo.....	200	210	175	200
Chicago Teleg	163	170	170	173
Erie Teleg. & Telep ..	60½	61½	59½	60½
Hudson River Telep...	53	58	54	57
Mexican Telep.....	65c.	70c.	65c.	70c.
TELEGRAPH:				
Am. Teleg. & Cable....	94	97	92	95½
Cent. & S. Amer. Cable.	121	123	116	121
Commercial Cable.....	155	....	150	160
Mexican Teleg.....	190	195	185	195
Postal Teleg. & Cable.	87	88	87	88
Western Union.....	86⅝	86¾	85⅛	85⅛
ELECTRIC:				
Boston Elec. Light...	105	....	105	....
Edison El. Ill.. Boston.	*138	....	136	140
" " " Brooklyn	100	101½	100	101
" " " New York	97	98½	96	98
" Co., Chicago...	....	119	120	122
" El. Lt., Phila..	133	136	135	140
Ed. Lt. & P. Co., San Fran.	112	....	130	....
General Electric.....	37½	37⅝	33⅝	34
" " Pfd...	74½	....	74	76
Penn. Ht., Lt. & Pwr....	13⅛	13¼	13	....
" " " Pfd.	18	18⅛	16⅛	....
Westinghouse Com:..	29¼	30	29	....
" Pfd....	52½	53⅛	53¼	53¼

Chicago Edison Company's Annual Meeting.

The annual meeting of the stockholders of the Chicago Edison company was held in the building owned by the company, 139 Adams street, Chicago, on June 8. The old officers were re-elected as follows: Samuel Insull, president, and F. S. Gorton, secretary and treasurer. The board of directors is composed of Edward L. Brewster, R. C. Clowry, John W. Doane, F. S. Gorton, Samuel Insull, Robert T. Lincoln, Joseph Leiter, John J. Mitchell, E. M. Phelps, Byron L. Smith, A. F. Seeberger, A. A. Sprague, and Lambert Tree. These gentlemen are as prominent financially and as well known as any citizens of Chicago.

The directors were authorized to make a $6,000,000 mortgage covering the entire property owned by the company to secure bonds in that amount bearing five per cent interest. It is intended to fund all outstanding obligations. The floating debt of the company at the present time is in the neighborhood of $250,000. The company has plans for some extensive improvements, particularly in the way of underground conduits and wires, which will take several years to entirely execute. There will be expended during the present year about $600,000 in extensions and betterments.

The gross receipts of the company for 1896 were $1,461.000, or about $25,000 more than for 1895. The operating expenses for 1896 were $-98,000, or about $56,000 less than for the previous year, although 15 per cent more current was supplied. The net earnings in 1896 were $560,000 as against $480,000 in 1895. The company's stock sells at 120 and pays eight per cent.

Many of the large new office buildings in Chicago are using Edison current and others of the older buildings have found it cheaper to use the Chicago Edison company's service than to operate isolated plants. From this source the company's increase in business has largely come. The number of small consumers has not materially increased. President Insull has adopted the policy of reducing the charge to consumers as the operating expenses are decreased.

The annual general meeting of the shareholders of the Ottawa, Ont., Electric Company was held on June 1. The report of the president and directors for the year ending April 30 was presented, showing a gross revenue of $153,788.66, being a very satisfactory increase over the previous year. A dividend of eight per cent was declared. The total number of incandescent lights installed is 53,331, an increase of about 5,000 during the year. The number of arc lights 497, motors 81, heaters 119. The old officers were re-elected, as follows: T. Ahearn, president and general manager; Hon. E. H. Bronson, vice-president; D. R. Street, secretary-treasurer; A. A. Dion, general superintendent; Redmond Quain and A. Bayly, auditors.

The Pioneer Arc Lamp.

The accompanying illustrations show in detail the Pioneer arc lamp made by the Electric Arc Light Company, 73 Watts street, New York city. About 1,000 of these lamps are to be installed in the mammoth Siegel-Cooper Building, now being erected in New York city. This lamp is largely the invention of Mr. L. B. Marks, and will burn singly across an incandescent circuit.

FIG. 5.—GAS-CHECK PLUG, INCLOSING BULB, AND LOWER CARBON HOLDER, PIONEER ARC LAMP.

The mechanism is extremely simple in character, consisting merely of a pair of solenoid magnets bearing the clutch device; the tension springs, rack-work and auxiliary mechanism common to all other arc lamps are entirely eliminated from the Pioneer. The lamp is not adjustable in any part, and can be installed and operated by unskilled labor.

The features which the manufacturers claim make the Pioneer arc lamp particularly valuable are, first, that the lamps require trimming at intervals of only 10 days or two weeks, while in some situations, with short hours of burning, a monthly trimming only would be necessary. The lamp does not require cored carbons, the ordinary solid carbons being used. This results not only in a saving on the cost of carbons, but also in that of trimming—items which, together, aggregate a saving of from $15 to $20 per year per lamp. Owing to the arc being inclosed, it is possible to run the lamp on incandescent circuits at a much higher potential than where the arc is not inclosed; so that the Pioneer lamp can be run singly, each lamp independent of the other. It follows from this, also, that one lamp can not rob the other of light, as is frequently the case where two are run in series. As regards distribution of light, which is an essential factor both in outdoor and indoor lighting, the inclosed arc has a decided advantage over the open-air arc. The perfect distribution of light obtained in the Pioneer lamp is owing to the fact that the high voltage between the carbons permits of a long arc and consequent omission of light rays through a wider angle. This quality of the lamp, it is claimed, will be appreciated by storekeepers and factory owners, as it avoids one of the greatest inconveniences attached to the old form of arc lamp.

Not the least important advantage of the inclosed arc is its perfect cleanliness, since all the carbon dust is completely consumed, and, above all, its perfect qualities as a spark arrester. This has an important bearing on the insurance question, and the lamp on this account has been thoroughly indorsed by the fire underwriters.

The entire system is covered by broad patents, all of which are owned by the Electric Arc Light Company, the manufacturers of the lamp. The company has secured a fine suite of offices and salesrooms at 687-689 Broadway, New York, and agencies are being established in every important city in the Union. The officers of the company are Lionel Sutro, president; Louis B. Marks, treasurer and electrician, and William C. Hubbard, secretary.

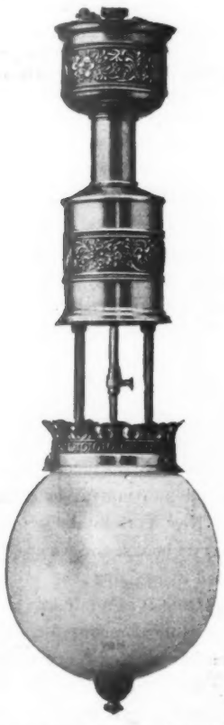


FIG. 1.—THE PIONEER STANDARD INDOOR LAMP.

FIG. 2.—THE PIONEER OUTDOOR LAMP.

FIG. 3.—PIONEER LAMP WITH TRIMMINGS AND OUTER GLOBE REMOVED.

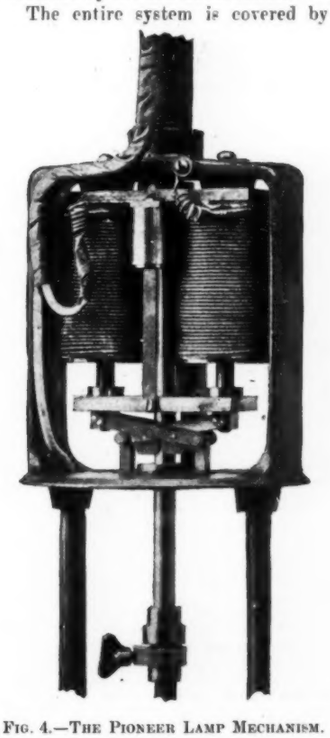


FIG. 4.—THE PIONEER LAMP MECHANISM.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, JUNE 17, 1896.

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The portrait of "A Typical American," which is issued with *Judge* this week is the finest specimen of lithographic portraiture we have ever seen. Major William McKinley, of Ohio, is the subject and his portrait covers two full pages of our artistic and enterprising contemporary.

SHOULD COLLEGE PROFESSORS TAKE OUT PATENTS?

The question as to whether or not college professors should take out patents for inventions which they may make in the course of their investigations and instruction in purely scientific work has been raised by an esteemed reader of the ELECTRICAL REVIEW. The point has often been made that a man with a purely scientific mind, engaged in purely scientific work, should have no connection in any way with the commercial side of the field of science in which he is working. On the other hand, it would seem that such men have unusual opportunities and facilities for doing just the right sort of work to lead up to successful commercial inventions.

The most notable example of this is the case of Lord Kelvin whose fiftieth anniversary as a professor in the University of Glasgow is being celebrated. His commercial inventions are very numerous and many of them very profitable, notably his electrical measuring instruments and marine compass. Prof. Edwin J. Houston and Prof. Elihu Thomson acquired their early training in electrical work while engaged in scientific instruction. Their commercial inventions are well known but neither is at present connected with any institution of learning.

While this question would probably resolve itself into one of purely professional ethics, a discussion of it will be of interest, and the ELECTRICAL REVIEW will be glad to hear from any one who has an opinion to express on this subject.

At a recent reception to the officers of the White Squadron, given by the Union League Club, of Brooklyn, Hon. Wm. Berri, president, Captain Harrington, of the "Terror," remarked on the number of navy men who had turned their attention to electrical work and retired from the service. Among the most distinguished are Lieut. Frank J. Sprague, of the Sprague electric railway and electric elevator; Lieut. S. Dana Greene, a prominent official of the General Electric Company, and Lieut. Louis Duncan, now of Johns Hopkins University and president of the American Institute of Electrical Engineers.

The druggists of Brooklyn are not satisfied with telephone rates they have to pay, and publish in the *Standard-Union* of that city a long committee report attacking the business-like stand of General Manager W. D. Sargent, of the telephone company. The report fails to show any tangible results and "was ordered placed on file."

LORD KELVIN'S JUBILEE.

The affection and esteem in which Lord Kelvin is held by scientific people in all parts of the world is fittingly shown in the splendid celebration in his honor at Glasgow, in which the city, the university and delegates from scientific bodies took part. Not the least ardent of Lord Kelvin's admirers are Americans, and it was thoughtful of the Commercial Cable Company to place a number of his American friends in direct communication with Lord Kelvin during the ceremonies in Glasgow. The honor and glory of the celebration were undoubtedly very gratifying to Lord Kelvin, but his greatest monument consists in the thousands of students whose minds have been trained in science under his able guidance.

ELECTROCUTION IN OHIO.

The warden and electrician of the State penitentiary at Columbus, Ohio, are investigating the question of electrocution in New York State. A recently enacted law provides that hereafter the punishment for capital crimes committed in Ohio will be by electrocution instead of by hanging. Professor E. D. Cope, president of the American Association for the Advancement of Science, has written a letter to Governor Bushnell, of Ohio, in which he declares that electrocution is retrogression. He asserts that in many cases electricity causes paralysis and not death, and that many persons supposed to have been killed in the electrical chair were in reality killed by the post mortem.

Professor Cope has taken the correct stand in this matter, and we are glad to note that he agrees so thoroughly with many opinions of the same kind expressed from time to time in the editorial columns of the ELECTRICAL REVIEW. We have always contended that the law providing for capital punishment by electrocution in New York State is a blot on our statute books, and we are greatly surprised to see that the intelligent State of Ohio is in a fair way to make as unenviable a record for itself in this matter as New York State has already done. Electrocution is barbarism, and its advocates are merely followers of the faddists who believe that electricity is capable of doing anything.

While the prison officials of Ohio are making their investigation, it would be well for them to interview certain men, who, if they will, can tell them the true story of why and how death by electricity came to be adopted in New York State. We venture to assert that they will not be edified by the story.

THE FINANCIAL SIDE.

The stock market this week made a square turn for the better. The overwhelming array of bull conditions has at last begun to be felt. The government crop report, issued Wednesday night, showed a much better condition for Spring and Winter wheat than was anticipated; railroad earnings continue to improve; the gold movement is dwindling, owing to the heavy sales of securities abroad, and the Republican party, it is believed, is on the point of declaring for a solid gold platform and unequivocally against free coinage of silver at any ratio without an international agreement. The lethargy displayed by stocks for nearly two weeks was terminated Wednesday in an all-around drop of 3 points. This was a move preparatory to a general advance. It left the market in a remarkably healthy condition, as it settled in strong hands stocks that would otherwise have been sold on a 2-point advance. There is nothing in sight to cause a set back at this time, unless it be a currency straddle at St. Louis. Business has shown very few signs of improvement. It will undoubtedly grow better as confidence is re-established.

There were further developments in New York transit affairs in the week, among them the consummation of a lease of the Madison avenue horse-car line to the Metropolitan Traction Company on terms set forth in this column some weeks ago. There were rumors in this connection of an alliance between Vanderbilt and Whitney capital, owing to the marriage in prospect between the two families.

The Manhattan extension received a set back on Thursday through the determined stand of Mayor Strong not to grant franchises unless the company would agree to build immediately to the northern limits of the city on the east side. It requires a three-quarter vote of the Rapid Transit Commission to grant concessions or franchises. It is understood that five of the members are in favor of accepting the railroad company's proposition, but this is not enough, owing to the opposition of the Comptroller and the Mayor and one vacancy in the Board. Parties in interest do not speak discouragingly of the outlook, believing eventually that they will be able to come together.

An extension of the Manhattan lines means the use of electricity as motor power and it is reasonable to assume that an exhaustive test or tests will be made before any such system is installed. I am told by General Electric officials that negotiations for the equipment of the Thirty-fourth street branch have not made any progress in the week, although there is a likelihood of their being consummated.

An unusually large number of electrical dividends were declared since my last report. The more important were as follows: Westinghouse preferred, regular quarterly 1¾ per cent, payable July 1. Books close June 20 and reopen July 2. Commercial Cable, the regular quarterly 1¾ per cent, payable July 1 to stock of record June 21. Books reopen July 2.

Western Union, the regular quarterly 1¼ per cent, payable July 15 to stock of record June 20. Books reopen July 1. Bell Telephone, regular quarterly 3 per cent and an extra 1½, payable July 15 to stock of record July 1. Books reopen July 14. Edison Electric Illuminating of Brooklyn, the regular quarterly 1½ per cent, payable July 15 to stock of record July 1. Books reopen July 15.

Mr. Isaac L. Rice informs me that for the year ending January 1, 1896, the Electric Storage Battery Company earned gross $328,000, and net $126,000. All other expenses were $123,000, leaving a net profit of $3,000. The gross earnings, it will be seen, were at the rate of $26,000 per month. Since the first of the current calendar year they have been $415,000, or at the rate of $83,000 per month. A comparison of these two figures shows the progress made by the company since it has got down to a working arrangement. I am told that great things are expected of it before the end of 1896. Regarding the Madison avenue car line test, Mr. Rice says that it is being made solely to determine the life of the batteries. It has been going on for some months and the batteries are in as good shape to-day as when put in.

At last the North American Company, although at the best but a shell, sees light ahead. Its $1,200,000 collateral trust notes, which were nothing more than a floating debt funded, have been discharged by the proceeds from the sale of its Milwaukee Street Railway bonds to J. P. Morgan & Company. These bankers sold bonds of street railway companies aggregating $5,100,000 this week, mostly in Europe.

The Western Union statement for the quarter ending June 30 shows a surplus after dividends of $64,700. The statement was not as favorable as expected, owing to the fact that March 31st quarter's earnings were overestimated by about $200,000.

The Edison Electric Illuminating Company of New York, for May, returned net earnings of $77,751, an increase of $2,605. For five months the net was $477,120 and the increase $59,392.

There was very little of interest in the electrical stock market. General Electric's high day was on Monday, it being 33. On Wednesday it touched 30¾ and subsequently rallied to 32. There were sales of the bonds at 90½. There was a fair demand for Edison Illuminating of New York bonds, the first mortgage selling at 07 to 107¼ and the consolidated mortgage at 103¾. American Telegraph and Cable was quoted at 93 in the fore part of the week and later at 91½. Western Union declined from 85½ to 84½ and subsequently rallied to 85⅞. The collateral trust 5's sold at 107½ to 107¾.

On the Boston Exchange, Bell Telephone advanced 1½ to 206½ on limited purchases. The stockholders have subscribed to 17,230 shares of the new issue of 21,500 shares of stock, leaving 4,270 shares to be sold at auction. Erie Telephone was unchanged at 59 @ 59¼, and New England Telephone at 91. Westinghouse common was bid 29 and offered at 30, and the preferred 52 and offered at 53. General Electric preferred was featureless. In Philadelphia, Electric Storage Battery common lost a point, and the preferred 2½ on Wednesday, both recovering subsequently. Pennsylvania Heat, Light and Power sold at 14¼ and later at 15. BAIN.

New York, June 13.

PERSONAL.

President Frederic Nicholls, of the National Electric Light Association, visited New York city last week.

Prof. M. I. Pupin, of Columbia College, will spend the Summer at Roughland Cottage, Norfolk, Ct.

Mr. Thomas D. Lockwood, of the American Bell Telephone Company, Boston, was a New York visitor last week.

Subway Commissioner Thomas L. Hamilton, of New York city, is attending the Republican National Convention at St. Louis.

Mr. A. M. Ake has resigned the treasurership of the Electricity Newspaper Company, of New York, and has been appointed auditor of the United States Rubber Company, of New York.

Mr. George A. McKinlock, president of the Central Electric Company, Chicago, who has been seriously ill for a number of months, is now rapidly recovering and his many friends throughout the country will be very glad to learn that he will soon be at his office to greet them. Mr. McKinlock has been greatly missed in electrical circles since his illness.

Suits under the Van Depoele Trolley Patents.

The General Electric Company has brought suits for injunctions against the Nassau Electric Railway Company, of Brooklyn, N. Y., the Union Railway Company, of New York city, and the Elmsford & White Plains, N. Y., Railway Company, to restrain their use of the under-running trolley, alleged to be an infringement of the Van Depoele patent owned by the General Electric Company.

It is also stated that a similar suit will be begun in New Jersey against the Walker Manufacturing Company, of Cleveland, recently incorporated in New Jersey, which, if successful, will prevent that company from supplying complete electric railway equipments.

Locating Defective Joints.

John C. Henry, Sheridan Building, Denver, Colo., has perfected a device for locating defective rail joints on electric railroads. Mr. Sheridan says that an electrician, with two assistants, can test and mark all the defective joints on several miles of track in a day with this instrument.

Death of Harrison J. Smith.

H. J. Smith, general superintendent of the Edison Electric Illuminating Company of New York, and president of the recent electrical show held in Grand Central Palace, while walking on a plank in his barn at Washingtonville, N. J., last Sunday, fell 15 feet to the floor. His skull was fractured and he was seriously injured internally. On Monday afternoon, following a period of consciousness, Mr. Smith was resting easily.

LATER.—Mr. Smith sank rapidly Tuesday morning and his death occurred at ten minutes of nine o'clock.

Canadian Electrical Association.

The sixth convention of the Canadian Electrical Association began its sessions at Toronto to-day and will continue during to-morrow and Friday. The list of papers to be read is as follows:

"Ocean Cables," historical, Chas. P. Dwight, Toronto; "Acetylene Gas," with demonstrations, George Black, Hamilton; "Meters," James Milne, Toronto; "Consideration and Discussion of the Government Electric Light Inspection Act;" "Some Central Station Economics," P. G. Gossler, Montreal; "Power Transmission by Polyphase Electro-Motive Forces," Geo. White Fraser, Toronto; "Operating Engines without a Natural Supply of Condensing Water," E. J. Phillip, Toronto; "The Outlook for the Electric Railway," F. C. Armstrong, Toronto.

Mead-Ecker.

Mr. Morris W. Mead, chief of the Bureau of Electricity, of Pittsburgh, will be married to Miss Johanna Louisa Ecker, of Pittsburgh, on May 30. The ELECTRICAL REVIEW extends its congratulations.

Four-Cent Street-Car Fares.

The managers of Milwaukee Street Railway, in a letter to Milwaukee aldermen regarding the proposed sale of commutation tickets at the rate of four cents, claim that it costs more than four cents to carry each person transported over the company's road, says the *Wall Street Journal*. The Milwaukee company put in force some time ago a universal transfer system so as to give the most value possible to the public. The course of the company's earnings has been such as to give the managers ground for hope that they could restore the sale of commutation tickets at the old rate of four cents, but the strike interfered. The company had several times offered to restore commutation rates if the council would refrain from hostile legislation and the granting of franchises. The date would be fixed as early as January 1, 1897, and the company would pledge itself to make extensions of its lines where necessary in the future. All that the managers asked was that the road should be able to maintain its condition and meet its bonded interest. As stated, the company has since been ordered by the council to sell commutation tickets at four cents.

Mr. A. S. Chase, president of the Benedict-Burnham Manufacturing Company, the Waterbury National Bank, the Waterbury Watch Company and several other Waterbury concerns, died last week at his residence in that city.

STEAM BOILERS: THEIR EQUIPMENT AND MANAGEMENT.

READ BEFORE THE NATIONAL ELECTRIC LIGHT ASSOCIATION, MAY 7, 1896, BY ALBERT A. CARY.

(*Continued from page 305.*)

Unfortunately, we find, in many works on the steam boiler, advice which can hardly be called sound. I refer to the advice given to those who are about to select a boiler for their own use. These works tell you, quite properly, that all surrounding conditions must be considered, including the nature of the service in which the boiler will be operated. Thus far the advice is good, and we find this followed by other sound advice, saying the pressure under which the boiler is to be operated controls not a little the general design; but, finally, we read that the character or quality of the feed-water used is a large factor in controlling the selection of boilers, while some assert still further that the quality of the fuel used also needs consideration when choosing the form of type.

The bad advice given amounts virtually to the following: If you have bad feed-water, carrying much impurity, use a poor boiler—one which is acknowledged to be poor in economy of fuel. In other words, nothing is quite as good, under these circumstances, as the old plain cylindrical boiler, into which you can climb periodically with a pick and shovel and remove the accumulation. Again, in case of "bad" fuel, the flues, or tubes, will pick up and accumulate the soot and dirt; so do not have any such "miserable things" about the boiler, notwithstanding the well known and acknowledged fact that they promote economy and reduce materially the space required for the boiler plant. If this is called good engineering, I'm afraid that I do not know what good engineering really is. I will say, however, in defense of the authors of some of these works, that their books were written some 10 or 15 years ago, during which time the engineer and chemist have been hard at work, and have since provided comparatively inexpensive means to remove the impurities found in boiler feed-water, or else to neutralize the worst part of the precipitated or other chemical matter, so as to make it comparatively harmless in the boiler. By taking advantage of these means, you can now go ahead, in most cases, in the selection of your boiler, and equip with the most economical steam generator that can be found on the market. As for the conditions formerly ruled by the quality of fuel available, these need not enter into any further consideration, providing you will equip your boiler furnace with proper devices, or construction, to handle the fuel you have available. In both of these matters you will find that the trained and experienced mechanical engineer can help you not a little.

In selecting a site for a new boiler plant the feed-water problem is one which must not be overlooked. A constant and never failing supply must, of course, be obtained and if a supply from more than one source is available, every one should be carefully analyzed by a specialist in this line of work, and much money will be saved in the end by the pursuit of this course. Bad feed-water is a thing to be avoided if such a thing is possible. I know of a certain electric light station having somewhat over 3,000 horse-power of boilers in which it was thought that a considerable saving could be obtained by digging wells in the basement of the building and using this water instead of the city water supply, which was easily available. The well water proved to be very bad and it cost this company over $20,000 to find out what I have just told you. It will often pay you to go a considerable distance to secure a good, pure water supply and run a line of piping.

The impurities contained in the water of large rivers is very apt to vary quite materially from time to time. This I found to be very true with the Mississippi River at St. Louis. This is not difficult to understand when we stop a moment and think of the immense territory this river drains. Local rains will find their way down the water sheds of their immediate vicinity and, of course, they will dissolve and pick up such mineral matter as may be in great abundance in that section of country. In another section of country where the character of the soluble mineral matter is very different, we will find another and quite changed contribution to the Mississippi, while a storm near St. Louis, or very low will make the water very muddy. Probably the oldest method of taking care of the impurities found in boiler feed-water is the use of a filter. There are many kinds of filters used for this purpose, but the principal ones may be brought under the following heads, for sake of classification, sand filters, block filters, and cloth filters.

When water holds matter in mechanical suspension, it can be effectively removed by the process of filtration, as long as the filtering material is kept sufficiently clean. The great importance of keeping clean the material through which the water is passed being well understood has led many inventors to produce what are known as "self-cleansing filters," which depend on processes more or less automatic, such as reversing the direction of flow of the water passing through the filter and causing the reversed current to flow with a considerable force and velocity. This will stir up the filter bed and carry the lighter impure matter to the surface, from whence it is discharged with the water used for this washing purpose, the discharge being continued until the water runs clear. The sand, gravel or other filtering material being too heavy to rise to the surface, after being turned over and over and raised some distance from its bed, falls back again to the bottom of the tank, ready for use as soon as the cleansing process is finished. Some filters are made to discharge upward, by means of a powerful jet of water, their entire filter bed of sand and other material. This passes up through a vertical pipe, more or less irregular in shape, until finally we find the entire bed deposited in a tank located immediately above the lower, regular filtering tank. From this upper tank the material is allowed to fall, by gravity, back into the lower tank, and the process of elevation is repeated until the filter bed is thoroughly washed. The impure water resulting from this operation is discharged from near the top of the upper tank. Of course, it will be easily understood that the greater the amount of impurity held in the water, the slower the passage of the water through the filter bed must be, to accomplish desirable results. The nature of the material to be held back by the filter also affects the rapidity of the filtration. By this means, nearly all of the visible impurities of the so-called "muddy water" can be removed, but there is still left, in most waters, scale-making impurities, far more dangerous in a boiler than this ordinary floating matter. These are found dissolved in the water. A little investigation will prove that our purifier friends are after this matter as well as that originally in mechanical suspension, but, of course, in order to entrap it in their filters, they must first precipitate it, so that it will also be held in the water as floating matter, and in order to do this we find them using chemicals, which are fed in automatically (in most cases) along with the feed-water, the chemicals, of course, being dissolved in water before being introduced into the filter. In some cases we find the sulphate of alumina used, which precipitates the organic matter; the sulphuric acid it contains displaces the carbonic acid of the carbonate of lime, forming the sulphate of lime in solution (which, of course, will scale boilers badly). After this combination the alumina is thrown down as the hydrate of alumina in a flocculent, gluey mass, which adheres to the particles of dirt or other floating matter, and on settling, drags them down together, accomplishing a desired result. In order to produce this result, the water acted upon must contain an alkali to combine with the sulphuric acid, such as in the carbonate of lime and carbonate of magnesia, but the sulphate of lime or sulphate of magnesia will not be affected in the manner described. In the above reaction we have left the dangerous sulphate of lime in solution in our water, and to take care of it we must also introduce along with our solution of sulphate of alumina a solution of caustic soda (about one-half the weight of the sulphate of alumina). This will combine with the carbonate of soda, which, in turn, will act on the sulphate of lime, forming the sulphate of soda, and either the monocarbonate or bicarbonate of lime, which is precipitated to the filter bed where it is entrapped.

Sometimes we find lime water fed into the filter along with the regular feed when the carbonate of lime or magnesia is dissolved in the water. This lime introduced combines with half the carbonic acid contained in the carbonate of lime, or carbonate of magnesia, forming the insoluble monocarbonates which are precipitated as floating matter to be caught in the filter bed.

The above examples will give a general idea of the use of chemicals with filters, and next we will find the filter men resorting to another method to precipitate the dissolved matter held in our feed-water and that is, by the means of heat. It is a well known fact that the carbonate of lime and the carbonate of magnesia are not able to retain their carbonic acid (which, alone, holds them in solution in the water) after the temperature is raised above 180 degrees Fahrenheit. The sulphate of lime and the sulphate of magnesia also become insoluble when their temperature is raised above 290 degrees Fahrenheit (this temperature corresponding to that of water under 40 pounds steam pressure). Taking advantage of these facts, certain filter men first pass the water through their machines, then send it on to the boiler. Here it is heated considerable above the temperature that will precipitate the lime and magnesia. The next operation is to draw the hot water from the bottom of the boiler with its floating impurities and pass it again through the filter which entraps the floating particles, thus taking them away from the boiler and preventing settling there of this scale-making matter.

The methods described above in connection with filter practice can all be found working with more or less success in many plants in this country.

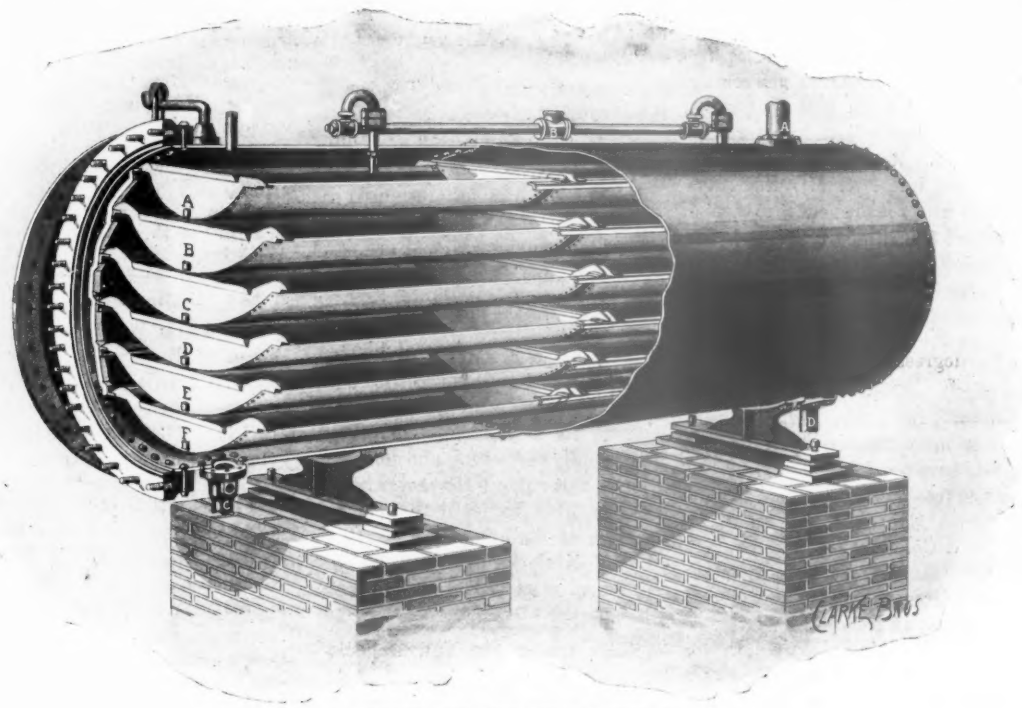


FIG. 5.—EXHAUST AND LIVE STEAM PURIFIER.

There is no doubt but what a filter is an excellent addition to many boiler plants, saving many times its cost in a comparatively short time, but it certainly is not applicable to all plants, and a thorough knowledge of the existing conditions should determine its desirability. In England and Germany we find a method of purifying feed-water which is but little known in this country, and it is a question of no small moment for engineers to decide whether this process, which has proved so successful abroad, would not prove equally valuable to our American plants, in which the character of the feed-water does not vary materially from that used on the other side. By this process large vertical tanks are placed near the boiler into which the cold feed-water is run. After it has been decided (by careful analysis) the kind and quantity of chemical or chemicals needed, these are introduced in amounts proportionate to the quantity of water used, and a precipitation follows the chemical combinations, made in a similar manner to the action just described in connection with filtration, but in this process no filtering takes place. Inside the vertical tanks are found a series of shelves placed in an inclined position and all sloping in the same direction. These shelves are often made V-shape, instead of being flat, thus sliding their contents down to one particular point. Opposite this point a pipe will be found leading out of the shell of the tank, and a straightway valve, or cock, opens or closes this pipe. This arrangement is found at the lowest point of each shelf, and all of the cocks are opened or closed at once by moving up or down a vertical rod. As the water flows from top to bottom of one of these tanks, the precipitation is thrown down on to these many shelves, finally sliding to their lowest points. As this sediment collects, from time to time, the vertical series of cocks are simultaneously opened, thus emptying all of the shelves of their deposited matter. By the time the water reaches the bottom of the tank most of its dangerous impurities have been left behind, and so it enters the boiler in a desirable state of purity.

In this country we find the carbonates and sulphates of lime and magnesia in boiler feed-water quite successfully eliminated by the use of exhaust and live steam purifiers.

Fig. 5 shows the construction of this apparatus very plainly, which consists of a plain cylindrical shell filled with a series of pans, or shelves, which are easily slid out of the shell when the end cover is removed. The impure feed-water is introduced through the pipe B, flowing into both ends of the top pan. As soon as this top pan is filled, the water spills over its edges, falling into the pan below and creeping along the lower bottom of the top pan as it does so. As soon as the second pan is filled, the water finds its way in the same manner to the pan beneath it, and so it continues to the bottom of the tank where it finds an exit at D, through which pipe it flows to the boiler. Steam is admitted into the shell at A. In the case of the exhaust purifier, the steam is supplied from the exhaust of the engine, in which case the water is heated to a temperature somewhat above 200 degrees Fahrenheit. In the case of a live steam purifier, steam is supplied direct from the boiler, raising the temperature of the feed-water from 300 degrees Fahrenheit upward, according to the pressure carried. In the first case, the temperature of the exhaust steam raises the temperature of the water to a point where it is practically impossible for it to hold the carbonic acid which holds the lime or magnesia in solution. In consequence, these minerals are precipitated in the pans or along their bottoms. A similar effect occurs when the live steam purifier is used; the sulphates of lime and magnesia are thrown down, collecting in and under the pans.

Fig. 6 is the reproduction of a photograph showing the appearance of one of these pans removed from the purifier after it had been in use for 42 days, while Fig. 7 shows the same pan before being put in operation. The water line in these purifiers is but a few inches from the bottom of the shell. Its pans are light and easily drawn out of their position, cleaned and replaced. The great advantage of having this deposit made outside of the boiler can, perhaps, be realized by consulting the following table, which roughly gives an idea of the loss of efficiency in a boiler, due to scaling.

Thickness of scale in inches.	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$
Loss of fuel, per cent.	2	4	9	18	27	38	60	90

(*To be continued.*)

FIG. 6.—PAN AFTER FORTY-TWO DAYS' USE IN PURIFIER.

FIG. 7.—PAN BEFORE USE IN PURIFIER.

Electric Lighting in Louisiana, Mo.

The present contract for lighting the streets of Louisiana, Mo., (a city of about 6,000 people, 100 miles north of St. Louis on the Mississippi River), will expire about October 1, at which time, or before, the City Council will probably make arrangements for a plant operated under city control, make a contract with the present company, or accept a bid from some other party. Louisiana is peculiarly located for the erection of a plant very economically, owing to city not being scattered. The Mayor of city is Henry L. Hart, to whom all inquiries should be mailed.

The Woonsocket, R. I., Electric Machine and Power Company is contemplating installing a storage battery in its Main street station.

THE ELECTRICAL EXPOSITION.

THE CLOSING OUT OF THE GREAT EXHIBITION SUCCESSFULLY MADE —A PROFIT OF $20,000 TO THE SHAREHOLDERS.

The work of clearing away the various exhibits installed at the Electrical Exposition in the Grand Central Palace, New York, has been concluded. The Exposition, as our readers know, continued for four weeks and was largely attended. A close estimate, with a few accounts unsettled, shows a profit to the stockholders of the Exposition Company of $20,000. The names of the stockholders who shared in the profits proportionately are as follows:

NAME.	NO. OF SHARES.
A. Markle	50
E. F. Peck	50
W. F. Weiss	25
H. L. Lufkin	50
E. H. Davis	30
C. O. Baker, Jr.	110
R. H. Beach	25
C. E. Stump	25
H. J. Smith	75
Nathan & Co.	50
L. F. Requa	25
C. R. Huntley	20
H. H. Harrison	170
H. Billings	15
W. A. Stadelman	25
John A. Seely	50
Geo. F. Porter	25
R. B. Corey	5
S. A. Douglas	50
C. I. Hills	25
M. Nathan	25
J. W. Godfrey	25
A. J. Belden	50
	1,000

The one annoying feature of the Exposition—the charge of fraud which provoked a libel suit—has been settled out of court, the defendant paying all costs and publishing a retraction.

There is considerable talk of a permanent electrical exhibit, but no decision had been reached the first of this week.

Julian Ralph, in a very graphic description of Coney Island in *Scribner's* for July, says: "It still remains the king of all popular resorts of America. One year's crowd on Coney Island was composed of 8,000,000 souls."

Improved Induction Coils and Variable Condensers.

Messrs. Elmer G. Willyoung & Company, of Philadelphia, have recently placed on the market an improved line of induction coils which are intended to compare in quality with the best types of foreign make, but at much lower prices. Fig. 1 illustrates the new Willyoung coil, from which it will be seen that the general plan of construction, especially as regards the "hammer head" vibrator, is similar to the English Apps coils, the most famous of which was made for Mr. Spottiswood and gave a spark in excess of 40 inches.

The iron core in each coil is of best grade Norway iron wire especially annealed, and each component wire is covered with a thin coat of shellac. The core lies inside of the primary coil and is enclosed in a hard-rubber tube of sufficient length to render impossible any sparking of the secondary coil to the core or the primary coil.

The secondary coil is wound in a large number of small sections, each insulated from its neighbors, and the coil as a whole saturated with special insulation by an original method in such a manner as to thoroughly exclude air, thus preventing any heating of the solid dielectric by bombardment, and consequent ultimate softening and break down of the insulation.

The electrical constants of the Willyoung coils have been determined with such care and accuracy that high efficiency is obtained, the maximum guaranteed spark length being secured by minimum amount of wire in secondary coil and with least possible weight of the iron core. For example, in coils of six, eight and ten-inch spark rating, not more than one pound of No. 34 Brown & Sharpe wire is used per inch of spark length, while the discharge in each case is exceptionally solid and heavy.

A new feature of great importance incorporated by Messrs. Willyoung & Company in their induction coils is a *variable* condenser as substitute for one of single value as placed in the base of coils of ordinary design. The function of the condenser, as is well known, is to return through the primary coil the energy of self-induction produced in it at break, in order to hasten the demagnetization of the iron core and thus produce a sudden rise of the electro-motive force in the secondary coil. As this self-induction energy depends upon the value of the primary current in use, it will be evident that a condenser of but one capacity is only suited for a particular exciting current and a particular primary spark length, without variation in either case. Even the change in electro-static capacity produced by varying the vacuum tube (such as in X-ray work) is sufficient to disturb the proper balance between self-induction and capacity. This not only reduces spark length in the secondary coil, but causes actual heating and combustion of the primary sparking points with result that repairs are probably necessary.

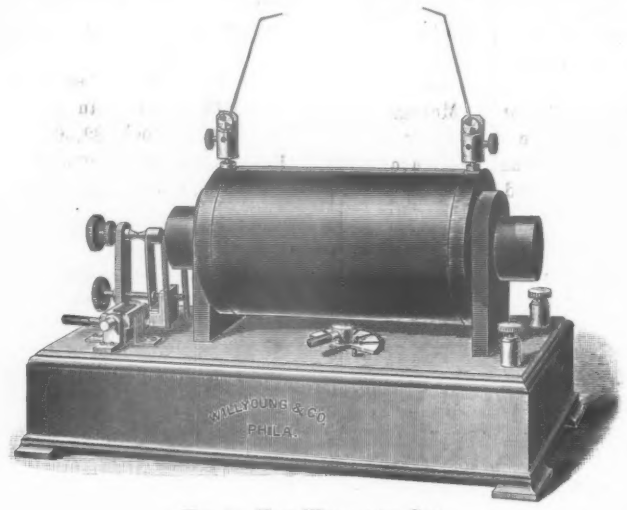


Fig. 1.—New Willyoung Coil.

Messrs. Willyoung & Company are also making a line of variable condensers for general experimental work, such as the study of resonance phenomena, alternating-current investigations, etc. Fig. 2 represents a 10 microfarad variable condenser with 10 sections of one-tenth microfarad each and nine sections of one microfarad each.

The method of construction will meet a demand for condensers, the capacity of which can be varied much more quickly and by much finer subdivisions than is possible in the former "plug-in and plug-out" forms. The regulating switches (see Fig. 3) as in a controlling rheostat, instantly change the condenser capacity with perfect smoothness of operation and effect.

For material of construction, tinfoil and a specially selected brand of unsized paper are cut to proper dimensions and stacked together dry. These pieces are then subjected to a peculiar insulating process by which every part is permeated with a solid dielectric. Both air and moisture are thoroughly and permanently removed. The condensers are capable of "standing up" continuously and without injurious heat effect on 500-volt alternating circuits, while direct currents of much greater potential can be safely employed.

All of the apparatus manufactured by Messrs. Willyoung & Company is sold through their sales agent, Mr. James G. Biddle, 944 Drexel Building, Philadelphia, who will be glad to send descriptive circular No. 170 to interested parties.

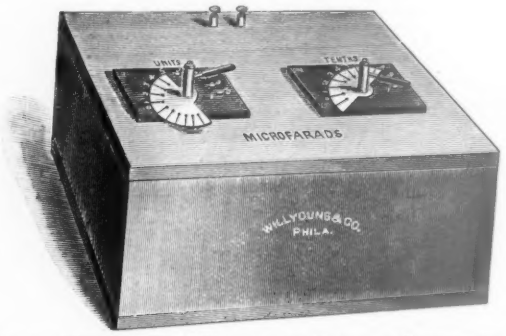


Fig. 2.—Willyoung's 10 Microfarad Variable Condenser.

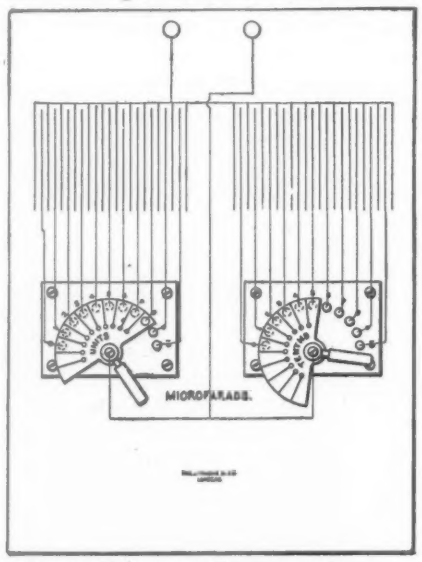


Fig. 3.—Willyoung's Regulating Switch.

Quick Work by the Cable.

The Direct Cable Company scored another victory yesterday in transmitting to the United Press the name of the winner of the Derby at Epsom Downs, beating all competitors from 30 seconds to 10 minutes. The race was finished at 3.27.15 P.M, London time. The bulletin announcing the fact that the Prince of Wales' Persimmon had won was filed with the Cable company at 3.27.30, and it was flashed over the English land lines and the cable and repeated to the United Press office in this city instantaneously, the first letters of the word Persimmon being received in this city before the transmission of the full word had been accomplished by the operator at Epsom Downs.

So perfect were the arrangements for the feat made by Superintendent Brown, of the Direct Cable Company, that there was no perceptible difference in the sending and receiving time, the transmission of the message occupying less than one second.

The work of the United Press, in distributing over its telegraphic circuits to the newspapers of this country the announcement of the name of the winner, was equally quick, and it is safe to say that before Persimmon had ceased his galloping stride and a blanket had been thrown over him his achievement was known in the office of every newspaper in the United States served with the news dispatches of the United Press.—*New York Times*, June 4.

The Management of the Nassau Electric Railway Criticised.

To the Editor of Electrical Review:

As a constant reader of the Electrical Review, and one who appreciates the great amount of street railway news you present each week, I want to thank you for your criticism of the Nassau Electric Railway Company, of this city, which appeared in your journal of June 10. I have noticed that the Electrical Review is fair and unprejudiced in its treatment of street railway matters, and knowing the many friends you must have in this branch of the industry, I am disposed to let you know that the better street railway interests indorse the stand you have taken in this instance. The recent acquisition of the Atlantic avenue line, in this city, by the Nassau company was evidently an unfortunate thing for the patrons of that line. The passengers along Seventh and Ninth avenues are rapidly becoming disgusted with the irregularity of the cars and their very unclean condition, and are making use of the elevated and Flatbush lines more and more. The recent terrible accident, in my opinion, can only be attributed to the bad management of the company. I don't know what the terms of the lease are under which the Nassau line took over the Atlantic avenue line, but I would like to predict that if a sudden halt is not called soon in the methods of the Nassau company, there will be but few dividends for the stockholders of the Atlantic avenue line when the damage suits, loss of patronage and the unprofitable long hauls to Coney Island are provided for.

Permit me to say, in conclusion, that I am not connected with any rival line, but am a citizen of Brooklyn, a patron of electric railways, and own investments in different electrical properties. I send you my name in full, but ask the privilege of signing myself C. G. M.

Brooklyn, N. Y., June 12.

The earnings of the Edison Electric Illuminating Company, of New York, for May, inclusive of the high-tension systems, were as follows:

	1896	1895	Increase.
Gross,	$169,166.87	$155,858.51	$13,308.06
Net,	77,751.92	75,146.35	2,6 5.57
Gross, 5 months,	946,826.62	868,310.79	78,525.83
Net, 5 months,	477,130.60	417,738.60	59,392.00

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

New Electric Railways.

HENDERSON, KY.—Application has been made to the City Council for the right of way for an electric street car line.

SCRANTON, PA. — The Citizens' Street Railway Company has been granted a franchise to construct a line of street railways within the city of Scranton.

FORT WAYNE, IND.—Mr. A. B. White has asked the city for a right of way for an electric railway between this city and New Haven.

SPRINGFIELD, VT.—The Springfield Electric Railway Company organized to-day with $50,000 stock taken. Officers were elected as follows: President, Adna Brown; treasurer, C. F. Richardson. The company is ready to contract for building the road from Springfield to Charlestown, N. H., six miles.

BRUNSWICK, ME.—I. C. Libby, of Waterville, Amos Gerald, of Fairfield, Galen C. Moses and Fritz Twitchell, met at Brunswick Thursday to consider the matter of constructing an electric railroad from Bath to Lewiston. Water power will be purchased at Brunswick and Lisbon Falls. The parties control a charter which has been in existence some three years.

WARREN, OHIO—The Mahoning Valley Electric Railway has commenced to double track its line from Westlake's crossing to Brier Hill, in Youngstown, and another year will extend the second track to Girard.

BRIDGEPORT, CT.—The Meriden road will be equipped with electricity.

COHOES, N. Y.—The controlling interest of the Cohoes City Railway has been sold to Robert C. Pruyn, president of the Albany City Railway.

CHICAGO, ILL.—A company has been formed in this place to build an electric line from this city to the central portion of Wisconsin. The road will be 280 miles long and trains are to be run at a 100-mile-an-hour gait.

FLINT, MICH.—An electric railway will probably be constructed between Flint and Fenton, at a cost of $250,000.

ONTARIO, CAN. — The Lanark County Electric Railway Company has been formed by Alex. Wendler, of Carthage, N. Y.; John B. Riley, Plattsburg, N. Y.; Thomas Henry, Montreal, Can.; Alex. H. Edwards and James Fowler, of Carleton Place, Ontario, Can. Capital stock, $100,000.

SHELBURNE FALLS, MASS.—The Shelburne Falls & Colrain Street Railway Company will probably establish their power house at Frankfort Mills.

CLAYTON, MO.—The Cross Country Railroad Company has been incorporated by Ernest P. Bell, Mark E. Lennan, Chas. Frederick, Julius Erickson and John T. McDowell, to build an electric railway from the Big Bend Road and Gore avenue to the St. Cyr Road. Capital stock, $100,000.

ANNISTON, ALA.—The Anniston Electric Company has been incorporated with the following officers: Howard W. Sexton, president and treasurer; Richard P. Huger, vice-president; John B. Rees, secretary. Capital stock, $50,000. This company succeeds Howard W. Sexton, trustee, in the ownership and management of the Noble Street and Union Passenger Depot Electric Car Lines.

NEW ORLEANS, LA.—The Canal & Claiborne Street Railway Company, J. H. DeGrange, president, will arrange for erection of proposed electric power house.

PECKVILLE, PA.—The Blakeley Rapid Transit Company has been incorporated with Daniel Davis, president, to build an electric railway four miles long. Capital stock, $24,000.

SUTTON, MASS.—Meeting was held recently to discuss the erection of an electric railway.

WESTBORO, MASS.—An electric road is to be constructed from Westboro to Northboro; franchise for same has been granted.

CHATTANOOGA, TENN.—The Chattanooga Electric Street Railway Company under its new management is making extensive improvements, which will cost about $50,000 when completed.

AMHERST, MASS.—The Amherst & Sunderland Electric Railway Company have been granted franchise.

PIQUA, OHIO—The Troy, Tippecanoe & Dayton Inter-Urban Railroad Company have applied for franchise for electric railway in this county.

NEW ORLEANS, LA.—A. G. Tebo and others are interested in the construction of an electric line on Napoleon avenue into the suburbs.

KEY WEST, FLA.—Col. John J. Philbrick and others will construct an electric railway.

HARTFORD, CT. — The Meriden, Waterbury & Connecticut River Railroad has been sold for $180,000, to Judge A. H. Roberton. It is reported that the road was purchased for the Consolidated Railroad Company, and that the latter company will equip it with electricity.

HAMILTON, ONT.—The International Radial Railway Company has been incorporated with Dr. Burns, president; M. W. Hopkins, Hamilton, Ont., to build an electric railway.

NANTASKET, MASS.—A three-rail electric system will be constructed.

VICTOR, COLO.—Mackery Ross and others have been granted franchise for construction of an electric railway.

BALTIMORE, MD.—The Metropolitan Railway Company will be incorporated by E. Southard Parker, of Washington, D. C.; A. C. Stevens and J. S. Lawrence, of Washington; Charles P. Janney, Leesburg, Va., and others, to build an electric system. Capital stock, $2,000,000.

ROCKVILLE, MD. — The Tennallytown & Rockville Electric Railroad has been purchased by C. T. Crosby for $30,000.

BOSTON, MASS. — General Construction Company has been incorporated by Henry Burgett, Jos. W. Longstreet, John J. Henry, Boston; to build railways, telephone lines, etc. Capital stock, $30,000.

PROVIDENCE, R. I.—The Union Railway Company is completing arrangements with the management of the Providence & Fall River branch of the Consolidated road. It is proposed to run electric cars.

NEW ORLEANS, LA.—The Canal & Claiborne Railroad Company, Jos. H. De Grange, president, has been granted permission to erect a power house, poles, wires, etc., preparatory to operating its lines by electricity.

ELROD, PA.—The Second Avenue Traction Company has contracted to extend its lines from this place to West Newton.

DULUTH, MINN.—A controlling interest in the Minnesota Point Street Railway Company has been sold and Eastern parties will hereafter direct its affairs. H. O. Underwood, of Boston, and clients of Dunn Bros., of Philadelphia, are the purchasers.

WOODBRIDGE, N. J.—This place is soon to be connected by trolley with Rahway, Sewan and Boynton Beach. The Union and Middlesex Traction Company is extending its line. The road is to be completed by July 4.

ROCKLAND, MASS.—The contract for building the Webster street extension of the Rockland & Abington Street Railway has been awarded to Horatio Gore & Company, of Boston.

TEXARKANA, ARK.—The street car system in this place is being extended.

TOLEDO, OHIO—Blair & Company, of New York, who recently purchased, for $1,500,000, the Toledo Electric Street Railway Company's lines, have consolidated with the Toledo Traction Company, the chief owners of which are N. B. Ream and W. F. Hale, of Chicago, and which is the oldest street railway corporation in Toledo. It is said a new company, with a capital stock of $5,000,000, will be organized.

NEW HAVEN, CT.—It is reported that an arrangement has been made by the Union Street Railroad Company, of Providence, R. I., with the New Haven company for the equipment of the Oakland Beach branch with electricity, involving a possible extension to East Greenwich, R. I.

PLATTSBURGH, N. Y.—The Plattsburgh Traction Company has been incorporated. The capital is $100,000, and the directors are: Henry M. Pierson, Harry G. Hunkle, M. B. Snevily, of New York city; Smith M. Weed, Henry E. Barnard, David F. Dobie, Wm. L. Pattisson, George M. Cole and George Sweet, of Plattsburgh.

BALTIMORE, MD.—The Metropolitan Railroad Company has been incorporated with a capital of $2,000,000, to build a crosstown system to connect the Patterson, Clifton and Druid Hill parks, Baltimore. R. S. Bigelow, of Rochester, and John T. Collins, of New York, are two of the incorporators. The company has still to obtain franchises.

Electric Light and Power.

MILLBURN, N. J.—Articles of incorporation have been filed by the Millburn Electric Company, organized for the purpose of dealing in electricity for light, heat and power.

CANNON FALLS, MINN.—This city will have an electric light plant. The village has granted a five-year franchise to D. and J. Valentine, who are now at work on the enterprise.

BERKELEY, CAL.—The Berkeley Electric Lighting Company has purchased a large lot at the foot of Channing way and is about to begin work on the erection of a large new plant.

MIDDLETOWN, CT.—A joint stock company has been formed at Leesville, to be known as the Salmon River Power Company. Those interested in the concern are Nelson Powers, of Leesville; F. C. Fowler and Charles Brownell, of Moodus, and Samuel E. Elmer, of Hartford.

NORFOLK, VA.—The Norfolk Gas and Electric Company has been incorporated with Samuel B. Lawrence, of New York, president; R. A. Doble, of Norfolk, vice-president; John B. Summerfield, of New York, secretary and treasurer. Capital stock to be not less than $25,000 nor more than $500,000.

MENDOCINO, CAL. — Mendocino Electric Company has been incorporated by W. A. McCormack, C. O. Packard, Joshua Grindle, L. A. Morgan, William Hesser, A. Brown and J. D. Johnson, to furnish electric light and power to the town of Mendocino. Capital stock, $1,000.

NEW SHOREHAM, ME. — Block Island Electric Lighting and Transportation Company has been incorporated, with a capital stock of $100,000.

DUNKIRK, IND.—Dunkirk Electric and Power Company has been incorporated, with a capital stock of $20,000.

LE MARS, IOWA—Le Mars Water and Light Company has been incorporated by W. J. Rogers, John F. Rogers and Cora E. Rogers. Capital stock, $150,000.

KNOXVILLE, TENN.—The Mutual Light and Power Company recently reported to erect electric light plant, has been incorporated by J. B. Harrison, A. B. Shelding, Alex. McMillan,

D. M. Haynes and J. L. Davis. They have placed order for necessary electrical machinery.

LAFAYETTE, COLO.—E. M. Cannon has commenced work on his electric plant, and will complete it in a short time.

WELCH, W. VA.—The Flat Top Central Electric Power Supply and Traction Company will be organized by Issac T. Mann, L. E. Tierney and others, to construct an electric plant, etc. Capital stock, $500,000.

POCAHONTAS, VA.—The Southwest Virginia Improvement Company is putting an extensive electric power plant in its machine shops.

WACO, TEX.—The Mayor may be addressed for information concerning the establishment of an electric lighting system.

STARKE, FLA.—George Thompson is interested in the erection of an electric light plant.

NEWPORT, KY.—The Cincinnati, Newport & Covington Street Car Company will erect an electric plant, etc., at a cost of $1,000,000. Plant will include shops, sheds and offices, with entire equipments of latest machinery of all kinds for street railway companies.

KINSTON, N. C.—The Mayor may be addressed for information concerning lighting of the city with twenty-five 2,000 candle-power lamps.

ANDERSON, S. C.—The Anderson Water, Light and Power Company will erect a $100,000 power plant at Seneca Shoals, Seneca River.

CHESTER, VT.—An $8,000 electric light plant will be established.

WASHINGTON, N. J.—A. J. Craft, Borough Clerk, can give information concerning lighting the streets of borough with electricity, bids for which are being invited until July 1.

HIGHLAND PARK, MICH.—Bonds to the amount of $30,000 will be issued for the erection of an electric light plant and waterworks.

FRANCONIA, N. H.—The Franconia & Sugar Hill Electric Lighting Company has been incorporated, with a capital of $200,000.

POTTSVILLE, PA.—An electric light plant is to be established here.

ROCKWELL CITY, IOWA—Contract has been let for the erection of a $7,000 electric light plant at this place.

BOSTON, MASS.—Plans have been made by Winslow & Wetherell for a storage battery building to be erected for the Edison Electric Light Company.

LEESVILLE, CT.—A joint stock company has been formed at this place, to be known as the Salmon River Power Company. Nelson Powers, of Leesville; F. C. Fowler and Charles Brownell, of Moodus, and Samuel E. Elmer, of Hartford, are interested.

WEST HAZLETON, PA.—An electric light plant is to be erected at this place.

New Telephone and Telegraph Companies.

BALTIMORE, MD.—The American Telephone and Telegraph Company, of this place, and the Independent Telegraph Company filed articles of consolidation and will hereafter be known under the former name. The capital stock of the new company is $15,000.

GREENBUSH, N. Y.—The poles for the new telephone exchange are all erected and the work of stringing the wire will begin as soon as the cross arms shall be in place. The company expect to have the exchange in operation by June 15.

ST. PAUL, MINN.—The Rochester Telephone Company has been incorporated with a capital stock of $20,000.

ALEXANDRIA, D. C.—Judge J. K. M. Norton, of the corporation court, yesterday afternoon granted a charter of incorporation to the United States Long-Distance Telephone and Telegraph Company.

IONIA, MICH.—The United States Telephone Company is said to be after a franchise to run poles through Ionia, connecting their line between Grand Rapids and Saginaw.

PITTSBURGH, PA.—About 50 representatives of the telephone interests of a score of small towns in Western Pennsylvania, Eastern Ohio and Northern West Virginia met recently at the Monongahela House and formed an organization for the purpose of establishing a system of exchange throughout this district. A permanent organization was formed. It is claimed that the companies represented in the scheme have 10,000 telephones in service, and represent a capital of several hundred thousand dollars.

ATHENS, GA.—A new telephone company is to be established at Macon, to be known as the Macon Telephone Company.

Increase of Capital.

PITTSBURGH, PA.—The stockholders of the Westinghouse Electric and Manufacturing Company have increased the capital stock from $10,000,000 to $15,000,000. The board of directors have accepted an offer to purchase from the Westinghouse company $3,000,000 par value of the second preferred or assenting stock. The sale of this stock is to enable the company to care for its floating debt, which has been incurred in the building of new works and other necessary expenses in providing for a large increase in the volume of its business.

New Manufacturing Companies.

NEWARK, N.J.—The New York Rail Insulation and Equipment Company filed articles of incorporation with the County Clerk to-day. The company proposes to manufacture and sell insulation material for all kinds of rails. The incorporators are Lloyd S. Reber, Charles M. Meyers and Willard H. Gould, all of this city.

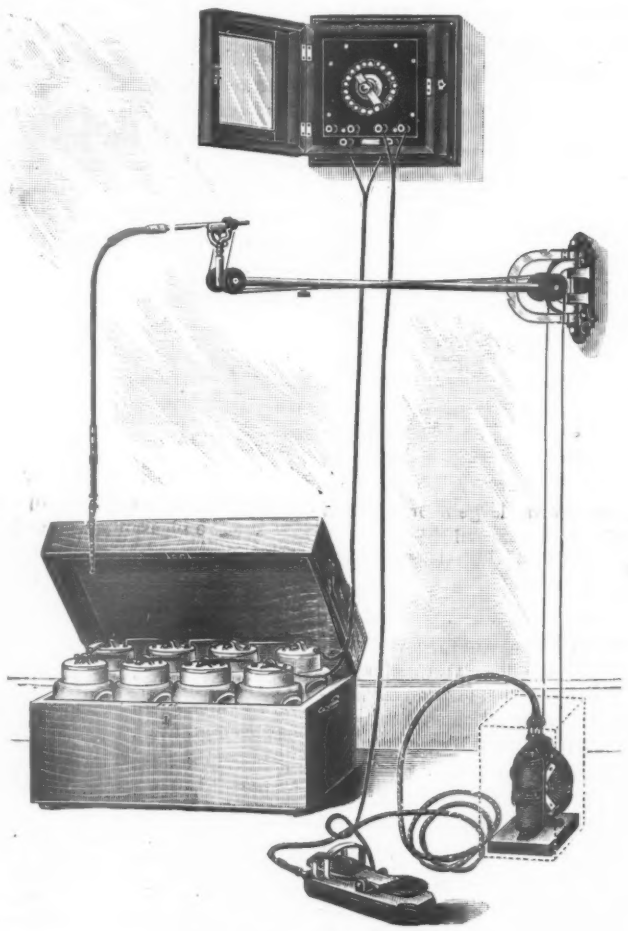
Mr. C. B. Price, of Pettingill-Andrews Company, Boston, Mass., passed through New York last week en route to the Catskills for a two weeks' vacation.

Dental Battery Outfit.

The dental battery outfit, illustrated herewith, consists of eight cells of the well known Edison-Lalande battery, type "W," which is extensively used for battery dental outfits, on account of its long life, freedom from waste and absolute constancy of current.

The reversible motor is placed on the floor and mounted on an oak base, having a cover which fits entirely over it, to protect it from the dust, leaving only the pulley exposed. It is belted to the Gilbert adjustable arm by a round cord belt, similar to that used on the foot engine.

The reversing foot switch is fitted with forward and backward movement, and also instantaneous stop attachment, when the motor is running in either direction.



A DENTAL BATTERY OUTFIT.

The rheostat is equipped with two sets of binding posts, one of them being for the motor connection and the other for attaching an electric plugger, mouth lamp, hot-air syringe, or electro-cautery, as may be required, it being so constructed that it will regulate the current perfectly for all these various devices.

The Gilbert wall bracket has an adjustable movement which enables it to be raised or lowered through an angle of 30 degrees, thereby avoiding the necessity of raising or lowering the chair. It has also an extension movement of about 12 inches which can further be used as a belt tightener. The upright socket at the end of this wall bracket is of the standard size to enable any S. S. White engine head to fit into it without alteration. The engine head can, therefore, be removed at will from the foot engine and attached to the electric engine without a moment's delay. This bracket is elegantly finished throughout in polished nickel and is of handsome design.

The S. S. White engine head, arm and hand piece are too widely known to need any description, as their excellence is universally attested. The outfit is made by the Edison Manufacturing Company, 110 East Twenty-third street, New York city.

The Triphase Electric Railway at Lugano.

The first application of the three-phase system for traction purpose has recently been realized at Lugano, Switzerland. The generating station is situated near Maroggis, at a distance of 12 kilometres from Lugano. It utilizes the hydraulic power of the Arogno torrent. A three-phase generator of 150 horse-power is driven from a 300-horse-power turbine, thus allowing of the installation of a second turbine.

The frequency is 80, and the working pressure 5,000 volts. The exciter is direct-coupled to the alternator spindle. At Lugano the pressure is transformed down to 400 volts. The cars carry a double trolley, and the rails are utilized as one conductor.

The use of the three-phase system offers the following advantages: The transmission of power from a distant source of power; the elimination of commutators on the motors; the speed of the cars remains constant, irrespective of load or gradient. At Lugano the maximum speed is 15 kilometres per hour. A hand regulator allows intermediate speeds to be obtained. The absence of any electrolytic action is also a great advantage. The chief disadvantage against the system is the use of two overhead conductors and a double trolley.—*L'Eclairage Electrique.*

KINDRED INTERESTS

Manning, Maxwell & Moore, 111 Liberty street, New York, report a very heavy demand for the season for steam instruments and boiler specialties.

The Williams & Abbott Electric Company, 9-11 Huron street, Cleveland, Ohio, have prepared for the telephone market a new telephone magneto bell which has several improved features.

The Ball & Wood Company, 15 Cortlandt street, New York city, is very busy filling orders for its well known high-class engines. The company's works are being run overtime to keep up with the orders.

The Standard Paint Company, 81 and 83 John street, New York city, make an excellent line of insulating paper which is not only coated, but thoroughly saturated with P. & B. compound. It is a good insulator, absolutely waterproof, air-tight and odorless.

One of the most perfectly equipped electrical manufacturing companies is that of Huebel & Manger, 286-290 Graham street, Brooklyn. They are makers of bells, push buttons and electrical specialties. The company occupies several large floors and have recently made some additions.

In spite of any feeling of hard times, the Bishop Gutta-Percha Company, of New York, have kept right on manufacturing their higher grades of rubber wires, and there seems to be a growing appreciation of the economy and advantage in buying the best grades of insulated wires.

The Wheelock battery, which is now being placed upon the market by J. H. Bunnell & Company, 76 Cortlandt street, New York, is said to deliver a powerful, steady current without weakening, and for telephone transmitter service, bell, gas lighting, phonographs and kindred work, is coming into popular use.

The Electric Appliance Company, Chicago, are showing a particularly satisfactory line of fan motors for the Summer trade. Their line of direct-current apparatus includes the celebrated Dayton ceiling fans, and their own Acme 110-volt direct-current desk or counter fan. In alternating apparatus they are still handling the celebrated Meston line of desk and ceiling fans.

The Baechtold & Parker Electric Company, 79-81 Washington street, Brooklyn, N. Y., in addition to the standard line of American arc dynamos, American lamps, and appliances, which they manufacture, have recently perfected and are now manufacturing an armature, made by the new method which increases the output of a 50-light machine to 60 lights, an average of increase of efficiency of 20 per cent. The improvement is a design of Mr. Baechtold of this company, who has had a long and most practical career in the construction of electrical machinery.

The Eclipse Electric Lamp Company, Buffalo, New York, in addition to manufacturing one of the most perfect electric bicycle lamps on the market, have prepared an elaborate line of decorative and miniature lamps from special designs and are now placing them on the market. A representative of the ELECTRICAL REVIEW, through the courtesy of the president, Mr. Thomas F. Cream, was shown through the large factory at Kensington, Buffalo, which has been recently filled with an extensive line of special machinery for making the electric bicycle lamps and the miniature lamps.

The India Rubber and Gutta-Percha Insulating Company has one of the pleasantest manufacturing sites in this country. Situated on a bend in the beautiful Hudson at Glenwood station, Yonkers, N. Y., it is at once convenient and healthful, and the large force of workmen employed never find cause for strikes or wrangling. Shipping by rail or water is always possible. Mr. W. M. Habirshaw, the enterprising head of the company, discovered that the site was for sale one day in passing along the river, purchased it at a bargain, and has had every reason to be pleased with the location ever since.

Despite the fact that the central and western States have been blessed with a delightfully cool season, the Central Electric Company's sales of fan motors are thus far away ahead of last season's output. This is accounted for by the great popularity of the Lundell fan. Old customers placed orders for these while "the frost was on the pumpkins and the fodder in the shock," and new customers ordered because there wasn't anything else in sight to equal the Lundell in simplicity and beauty of workmanship. The Central Electric Company, Chicago, have a complete line of fans for direct and alternating currents and for desk or ceiling use. A catalogue will be sent to any address.

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ELECTRICAL PATENTS

ISSUED JUNE 9, 1896.

561,560 Electric arc lamp; S. Bergmann, New York, N. Y.

561,565 Automatic electrical battery cut-out; H. W. Clelland, Wilkinsburg, Pa.

561,581 Monroe Guett, Hartford, Ct.

561,590 Armature for dynamo-electric machines; F. P. Ide, Eau Claire, Wis.—Consists of a core with armature coils disposed thereon, and U-shaped retaining links adapted to secure said coils in position.

561,593 Dynamo-electric generator; B. G. Lamme, Pittsburgh, Pa.—A direct-current dynamo having an armature provided with a plurality of sets of coils of substantially equal resistance alternating in position and permanently connected in series through the commutators.

561,601 Register for telephones; E. L. Morey, Portland, Ore.

561,619 Toll counter for telephone lines; G. P. Seligman, Paris, France.—Consists of a number of plug circuits and a single main relay and a source of current connected therewith, an auxiliary relay in each plug circuit controlling the continuity thereof and controlled by the main relay, and means for connecting the main relay with any plug circuit.

561,636 Form for winding armature coils; J. A. Webber, Lynn, Mass.—A winding form for armature coils, comprising a suitable base, means for confining the coil, and a series of terraces, or grooves, upon which one part of the coil is wound.

561,653 Telegraph relay; E. Butler, New York, N. Y.—Consists of a pair of electro-magnet coils provided with cores, an armature therefor opposed to both cores and a solenoid surrounding the shaft of the armature and being in circuit with the magnet coils.

561,657 Thermo-electric generator; H. B. Cox, Hartford, Ct.

561,699 561,700 Electric motor; W. H. Cooley, Brockport, N. Y.—An alternating-current machine, the armature and field thereof, rectifying devices carried by such armature or field and co-operating with others carried by a third element, and means for establishing and maintaining a relative synchronous rotation between such third element and the armature or field carrying such rectifying devices.

561,711 Electric meter; R. O. Hood, Danvers, Mass.—An electric motor, a magnetic damping device for regulating the speed of said motor, with a commutating device for the motor placed between its armature and the magnetic damping device.

561,735 System of electrical distribution; C. P. Steinmetz, Lynn, Mass.

561,777 Electrical apparatus for controling motion of cranes; J. A. Esseberger, Berlin, Germany.

561,803 Dynamo-electric machine; F. G. Mayer, Chicago, Ill.—An outer cylindrical casing and core, an armature adapted to revolve between said casing and said core, and openings in said casing and core running lengthwise of said machine to break magnetic lines of force generated by said armature and running crosswise of the magnetic circuit generated in said core.

561,810 Electric battery element; G. J. Ortner, Pueblo, Colo.

561,821 Electric railway; W. M. Schlesinger, Philadelphia, Pa.—An electrical conductor composed of superposed plates of copper and iron or steel of segmental form in cross-section, with traveling brushes contacting with the steel or iron plate of the conductor.

561,828 Electric elevator; H. R Smith, Chicago, Ill.—A hoisting motor comprising a solenoid having a stationary core and a movable coil, said coil connected to the car-hoisting cable.

561,830 Electric railway; C. E. Stanley, Gallipolis, Ohio.

561,838 Arc interrupter for street car controllers; G. Valley, Cleveland, Ohio.—Comprises essentially an electro-magnet internal to the drum and having projections from its pole pieces extending through the drum in proximity to the contact pieces thereof.

561,839 Reversing and cut-out switch used in electric street cars; G. Valley, Cleveland, Ohio.

561,867 Electric motor and motor generator; W. H. Cooley, Brockport, N. Y.

561,872 Electrical accumulator; G. De Schrynmakers, Brussels, Belgium. — Has negative material therein and the depolarizing peroxid arranged in direct contact with the negative material.

561,878 Galvanic battery; T. E. Fogalsang, Sacramento, Cal.—Acid electrolyte mixed with a solution of eucalyptus.

561,881 Electric chime; J. H. Gerry, Brooklyn, N. Y.

561,886 Igniting device for gas or petroleum engines; A. A. Hammerschlag, New York, N. Y.

561,898 Electric railway. 561,899 Continuous-current rectilinear motor; P. W. Leffler, Chicago, Ill.

561,918 561,919 Electrical measuring instrument; H. A. Rowland, Baltimore, Md.—A dynamometer, a shunt box connected to the terminals of the dynamometer and a pivoted arm making frictional contact with the base of the instrument and carrying a reading scale.

561,943 Electric self-winding clock; R. A. Mitchell, Brooklyn, N. Y.—Consists of a winding electro-magnet having a swinging armature, a segmental gear having a counterbalance and moving with said armature, a train of winding gears driven by said electro-magnet through a ratchet and pawl, a flywheel and a current interrupter actuated by said clock.

561,951 Electrical connection; T. Grutting, St. Paul, Minn.

GENERAL NOTES.

The stockholders of the Brush Electric Company, of Baltimore, held their annual meeting recently and elected six of the old board of directors. The following additional gentlemen were elected directors for the ensuing year: George Westinghouse, Jr., Dr. Whitridge and Summerfield Baldwin.

Six new trolley express cars of the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., will be put in operation on June 15. Each will make four or five trips daily. President Rossiter says that no attempt, as far as he knows, will be made to stop the new trolley service by the regular express companies, and that the express cars will not interfere with the passenger traffic.

A Westinghouse Dividend.

The Westinghouse Electric and Manufacturing Company has declared a quarterly dividend of one and three-quarters per cent on preferred stock, payable July 1. Transfer books close June 20 and reopen July 2.

Reduced Rates To Chicago.

Account of the Democratic National Convention, Chicago, Ill., the B. & O. R. R. will sell excursion tickets from all Ticket Stations on its lines east of the Ohio River, for all trains July 3, 4, 5, and 6, good for return passage until July 12, inclusive, at one single fare for the round trip.

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The complete plant of the Delevan Electric Light and Power Company, Delevan, N. Y., a place of 1,000 population, located in the northeast corner of Cattaraugus County, will be sold on Tuesday, the 14th day of July, 1896, one o'clock P. M., at that place, to the highest bidder. Here is an opportunity for some engineer with a small amount of money to own and operate his own plant. He would require no help. The plant is operating successfully and earning a good income, but on account of the management does not pay dividends. For particulars, address Lyman J. Cheney, Receiver, Delevan, N. Y. Time will be given on part of the purchase price.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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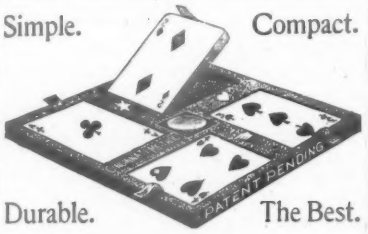

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All communications to this journal should be addressed, after this date, to the

Electrical Review,

TIMES BUILDING,

P. O. Box 2339, NEW YORK.

April 25, 1896.